REPUBLIC OF SOUTH AFRICA

REPUBLIEK VAN SUID AFRIKA

PATENTS ACT, 1978

CERTIFICATE

In accordance with section 44 (1) of the Patents Act, No. 57 of 1978, it is hereby certified that

INVENTO SPOLKA Z O.O.

has been granted a patent in respect of an invention described and claimed in complete specification deposited at the Patent Office under the number

2006/4995

A copy of the complete specification is annexed, together with the relevant Form P2

In testimony thereof, the seal of the Patent Office has been affixed at Pretoria with effect from the **28th** day of **November 2007**

Registrar of Patents

FORM P2

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
REGISTER OF PATENTS

OFFICIAL APPLICATION NO	LODGING DATE: PROVISIONAL	ACCEPTANCE DATE
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INTERNATIONAL CLASSIFICATION	LODGING DATE: COMPLETE	GRANTED DATE
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APPLICANTS SUBSTITUTED	DATE REGISTERED
(71)	

ASSIGNEES	DATE REGISTERED
(73)	

FULL NAME(S) OF INVENTOR(S)
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TITLE OF INVENTION
(54) A PREFORM OF A PLASTIC CONTAINER PARTICULARLY FOR PACKAGING FOODSTUFFS

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PATENT OF ADDITION NO	DATE OF ANY CHANGE
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FORM
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AMENDMENTS AND RECTIFICATIONS, ETC

Document	Date of Application	Advertisement Date	Opposition Date	Allowance or refusal	Date of Letter

PROCEEDINGS BEFORE THE COMMISSIONER OF PATENTS

Nature	Taken by:	Against	Date commenced	Date of Order	Appeals to Supreme Court TPD/AD	Date Withdra

LICENCES, ATTACHMENTS AND HYPOTHECATIONS

Nature	In favour of:	Date registered	Date cancelle

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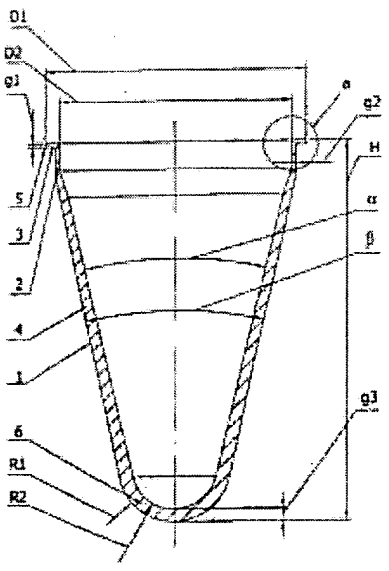
(74) Common Representative: LEWANDOWSKI, Dariusz, Ul. Kamyńskiego 24/85, PL-02-123 Warszawa (PL).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM).

(Continued on next page)

(54) Title: A PREFORM OF A PLASTIC CONTAINER PARTICULARLY FOR PACKAGING FOODSTUFFS



(57) Abstract: The invention relates to the preform to produce a plastic container for packaging foodstuffs, and especially to blow mould thin-walled containers which can be hermetically closed with a metal lid by double seaming. The preform (1) includes a body (4) and a convex hemispherical bottom (6). The body (4) has a conical shape that flares towards a cylindrical neck (2) surrounded by a flange (3) that terminates in a thickened rim (5). Preferably, the angle (α) at which the internal body surface (4) flares towards the cylindrical neck is greater than the angle (β) at which the external body surface (4) opens upwards, and the thickness (g2) of the cylindrical neck (2) is less than the thickness (g3) of the bottom (6).

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European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

— *of inventorship (Rule 4.17(iv)) for US only*

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

A preform of a plastic container particularly designed for packaging foodstuffs

The field of the invention

This invention relates to the preform of a plastic container particularly designed for packaging foodstuffs. This preform is formed using the conventional injection moulding machinery and utilised to form plastic containers, such as cans, for packaging foodstuffs, and especially to blow mould thin-walled containers which can be hermetically closed with a metal lid secured to the container by seaming the lid flange on filling machines, without deforming the flange or the cylindrical neck under it.

The state of art

The Polish patent application no. P 336 680 A1 relates to a plastic preform designed for forming thin-walled containers. The preform has a threaded neck and a cylindrical body terminated with a convex hemispherical bottom. The body diameter of this preform is 0.5 to 0.85, and the body wall thickness is 0.08 to 0.18, of the neck diameter.

It has been known for some time how to form thin-walled containers terminated with a flange by blow moulding the conventional preform and then severing the top portion of the container including a threaded neck. In this way immense amounts of scrap are produced, which the result that the whole process is highly uneconomical. Furthermore, this method leaves much uncertainty about the reliability of the closure, including its tightness and resistance to pressures inside the container. The edge of the container flange may become nicked by cutting operations and its thickness may vary along the circumference, which is normal as the flange is blow moulded as a part of the side wall of a larger container.

In order for the closure of the plastic container to be tight under pressure, it would be best if the container was formed from the injection moulded preform by a stretch blow moulding process.

Patent EP 0482652B1 describes a cylindrical preform with a flat bottom, wherein the bottom is much thinner than the preform walls that gradually slightly part. Due to the fact that the flow of material is hindered, it is impossible to achieve the flange thickness that is below 0.3 mm. The preform flange is smooth and does not have a thickened rim.

Patent WO-A 83/01766 presents a preform, which is generally cylindrical in shape and slightly tapers in the downward direction; its walls and bottom have the same thickness. The flange is smooth and does not have a thickened rim. It has been noted in the document that it is impossible for one to achieve a good degree of orientation of the material in the flange of such a preform; hence, its strength is insufficient for good quality connection between the metal lid and the container.

The optimum solution for the cylindrical neck and the flange is to come as closely as possible to the dimensions of a metal container, while maintaining the best possible strength parameters. In this way,

the container formed from the preform by a stretch blow moulding process could be efficiently closed by seaming a metal lid, thereby providing a reliable closure for carbonated beverages under pressure. This invention brings us closer to solving this problem.

The summary of the invention

The subject preform for forming plastic containers has a conical shape with a convex hemispherical bottom. The body of the preform flares towards a cylindrical neck surrounded by a radially outwardly extended flange terminated in a thickened rim. The opening angle of the internal conical surface of the body is greater than the opening angle of the external conical surface of the body; hence, the bottom is the thickest part of the container body and the cylindrical neck is significantly thinner than the bottom. The inflow of the material to the neck space and then to the flange is easy. This is due to the fact that the bottom at the injection point is relatively thick, the walls are appropriately inclined and their thickness tapers in a favourable manner. The material flow velocity in the mould is relatively high during the forming process with the result that the time taken by the material to reach the preform peripheries, including the flange, is short and a decline in temperature of the flowing material is much lower, which allows for appropriate filling and orientation and ensures a far better flange strength. In this way, it is possible for the flange thickness to be less than 0.3 mm, which is required for good quality seaming of the metal lid. The best seaming quality is achieved when there is a gradual change in thickness between the cylindrical neck and the flange and the transition between these two elements is arched.

Preferably, the ratio of the flange thickness to the cylindrical neck thickness should be approximately 0.8.

Furthermore, in order to ensure that the container metal lid fits precisely into the flange rim, it is desirable that the angle between the flange and the cylindrical neck is $180^0 - \gamma$, where γ lies within a range of 60^0 to 90^0, and most preferably equals 78^0.

In order for the seaming operation to ensure a good quality connection between the pressure container and the metal lid, the flange should terminate in a thickened annular rim showing on one or both sides of the flange ending. The height of the annular thickened rim should vary from 1.1 to 2.0 of the flange thickness.

The flange in the axial sectional view may also have a rectangular rim whose height is generally equal to the flange thickness. Such flanges can be used in containers where there is no internal pressure involved. In such a case, the angle γ is preferably 90^0.

The brief description of the drawings

The present invention has been described in greater detail in the figures below. We believe that these figures illustrate the most efficient version of the preform. Fig. 1 shows an axial sectional view of the preform. Fig. 2 shows an enlarged picture of the preform flange with a double-sided annular thickened rim. Fig. 3 shows an enlarged picture of the preform flange with a one-sided annular

thickened rim on top of the flange. Fig. 4 shows an enlarged picture of the preform flange with a one-sided annular thickened flange rim underneath the flange. Fig. 5 shows an enlarged picture of the preform flange with rectangular flange rim.

The most efficient version

As shown in Fig. 1, the preform 1 of a plastic container particularly designed for packaging foodstuffs, includes a body 4 with a convex hemispherical bottom 6. The body 4 has a conical shape that opens upwards and ends with a cylindrical neck 2 surrounded by a radially outwardly extended flange 3 terminated in a thickened rim 5. The angle α at which the internal body surface 4 opens upwards is greater than the angle β at which the external body surface 4 opens upwards. In the axial sectional view, the internal radius R2 of the bottom 6 of the body 4 is less than the corresponding external radius R1. The thickness of the body 4 decreases gradually starting from the bottom 6; therefore, the thickness g2 of the cylindrical neck 2 is significantly less than the thickness g3 of the bottom 6. The flange thickness g1 is less than 0.3 mm.

Fig. 2 shows an enlarged rim 5 of the flange 3 of the preform 1 which is deviated from the cylindrical neck at an angle of $180^0 - \gamma$, where γ lies within a range of 60^0 to 90^0. The flange 3 terminates in an annular thickened rim 5a on both its sides. The height h of the thickened rim 5a varies from 1.1 to 2.0 of the flange thickness g1.

Fig. 3 shows an enlarged rim 5 of the flange 3 of the preform 1 which is deviated from the cylindrical neck at an angle of $180^0 - \gamma$, where γ lies within a range of 60^0 to 90^0. The flange 3 terminates in a one-sided annular thickened rim 5b on the top of it. The height h of the thickened rim 5b varies from 1.1 to 2.0 of the flange thickness g1.

Fig. 4 shows an enlarged rim 5 of the flange 3 of the preform 1 which is deviated from the cylindrical neck at an angle of $180^0 - \gamma$, where γ lies within a range of 60^0 to 90^0. The flange 3 terminates in a one-sided annular thickened rim 5c underneath it. The height h of the thickened rim 5c varies from 1.1 to 2.0 of the flange thickness g1.

Fig. 5 shows an enlarged rim 5 of the flange 3 of the preform 1 which is deviated from the cylindrical neck at an angle of $180^0 - \gamma$, where γ lies within a range of 60^0 to 90^0. The flange 3 terminates in a rectangular rim 5d whose height h is generally equal to the flange thickness g1.

The preform 1 as shown in Fig. 1 with external diameter D1 and height H is made of polyethylene terephthalate (PET), a thermoplastic material specifically designed for packaging foodstuffs. When using the subject preform to blow mould a thin-walled container, the diameters D1 and D2 of the cylindrical neck 2 and the flange 3 do not change. A relatively small flange thickness allows for a better fit of the metal lid at the first stage of the double seaming process. The thickening of the flange rim facilitates the holding of the preform during the blow moulding operation and allows for further tightening of the metal lid against the pressure container body at the second stage of the double seaming process.

Claims

1. A preform of a plastic container particularly designed for packaging foodstuffs comprising a container body with a convex hemispherical bottom, wherein the body (4) has a conical shape that opens upwards and ends with a cylindrical neck (2) surrounded by a flange (3) terminated in a rim (5).
2. The preform according to claim (1) is characterised by that the angle (α) at which the internal body surface (4) opens upwards is greater than the angle (β) at which the external body surface (4) opens upwards, and the thickness (g2) of the cylindrical neck is less than the thickness (g3) of the bottom (6).
3. The preform according to claim (2) is characterised by that the thickness (g1) of the flange (3) surrounding the cylindrical neck (2) is less than 0.3 mm and that the wall thickness (g1) is less than or equal to the wall thickness (g2).
4. The preform according to claim (1) is characterised by that the transition between the cylindrical neck (2) and the surrounding flange (3) is arched.
5. The preform according to claim (1) is characterised by that the flange (3) is deviated from the cylindrical neck (2) at an angle of $(180^0 - \gamma)$, where (γ) lies within a range of 60^0 to 90^0.
6. The preform according to claim (1) is characterised by that the rim (5) of the flange (3) has a annular thickening (5a) on top and underneath it, whose height (h) varies from 1.1 to 2.0 of the flange thickness (g1).
7. The preform according to claim (1) is characterised by that the rim (5) of the flange (3) has a ring-like one-sided thickening (5b) on top of it, whose height (h) varies from 1.1 to 2.0 of the flange thickness (g1).
8. The preform according to claim (1) is characterised by that the rim (5) of the flange (3) has a ring-like one-sided thickening (5c) underneath it, whose height (h) varies from 1.1 to 2.0 of the flange thickness (g1).
9. The preform according to claim (1) is characterised by that the rim (5) of the flange (3) has a rectangular ending (5d) whose height (h) is generally equal to the flange thickness (g1).

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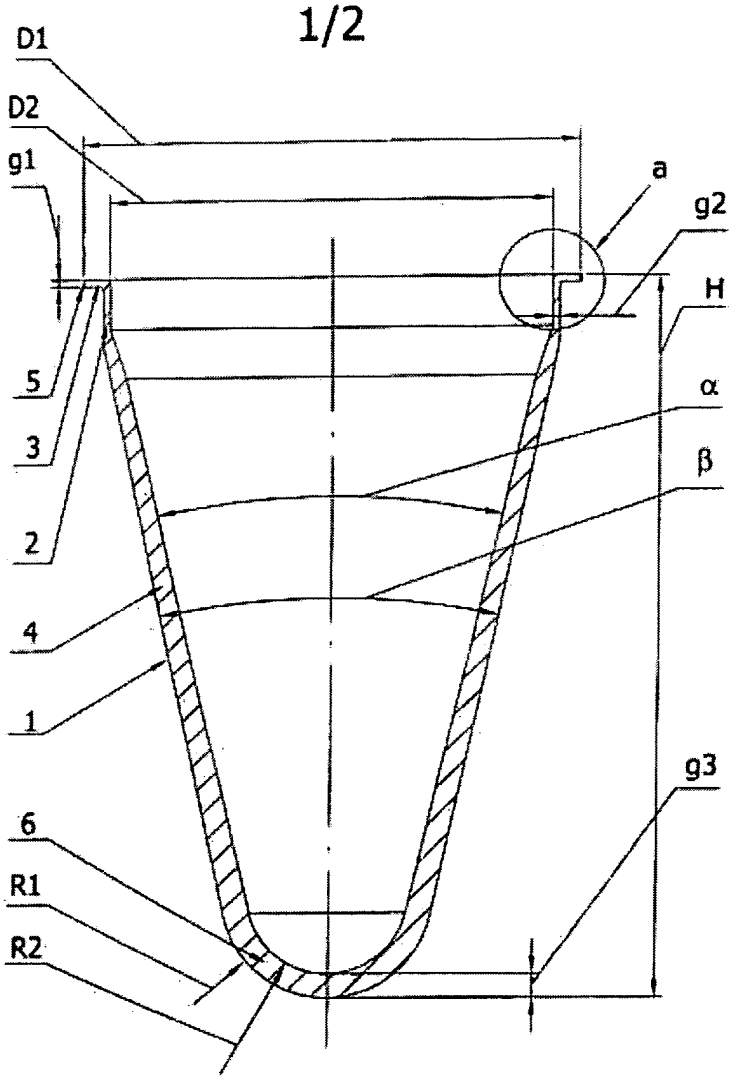

FIG. 1

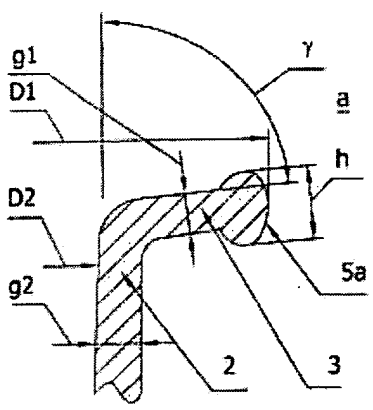

FIG. 2

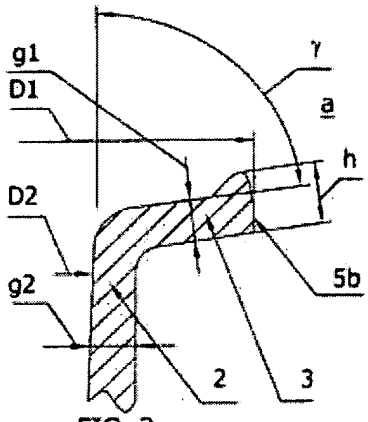

FIG. 3

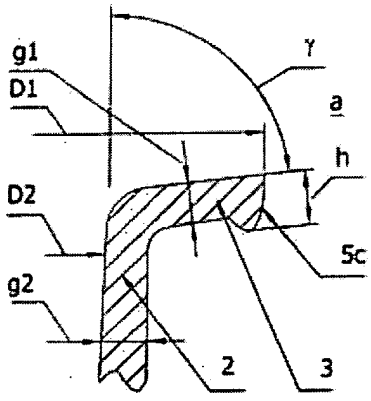

FIG. 4

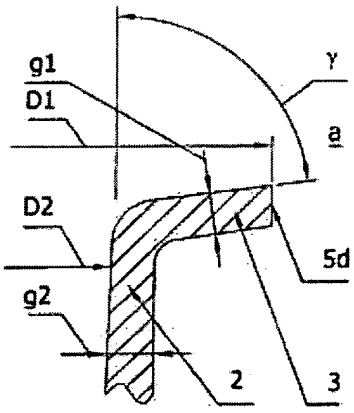

FIG. 5

INTERNATIONAL SEARCH REPORT

Int. nal Application No
PCT/PL2004/000092

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D1/02 B29C49/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 4 751 035 A (MCHENRY ET AL) 14 June 1988 (1988-06-14) column 28, line 34 - line 45 column 29, line 12 - line 23	1,2,4,5, 9 3,6-8
X	WO 83/01766 A (THE CONTINENTAL GROUP, INC) 26 May 1983 (1983-05-26) cited in the application page 4, line 19 - page 5, line 3; figure 2	1,5,9
Y	EP 0 482 652 A (NISSEI ASB MACHINE CO., LTD) 29 April 1992 (1992-04-29) cited in the application claims 1-4	3

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[X] Further documents are listed in the continuation of Box C.

[X] Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 March 2005	18/03/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Ingelgard, T.

Form PCT/ISA/210 (second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

Application No
PCT/PL2004/000092

C(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 5 833 085 A (VALYI ET AL) 10 November 1998 (1998-11-10) column 1, line 37 - line 43 column 3, line 19 - line 29; figure 2	6-8

Form PCT/ISA/210 (continuation of second sheet) (January 2004)

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
P405/2005		
International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/PL2004/000092	19.11.2004	20.11.2003

International Patent Classification (IPC) or national classification and IPC
B65D1/02, B29C49/00

Applicant
INVENTO SPOLKA Z O.O.

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 5 sheets, as follows:
      - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      - ☒ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the opinion
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☒ Box No. VII Certain defects in the international application
   - ☒ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
20.06.2005	14.12.2005

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Form PCT/IPEA/409 (Cover Sheet) (January 2004)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/PL2004/000092

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-4 received on 20.06.2005 with letter of 20.06.2005

Claims, Numbers

1-5 received on 20.06.2005 with letter of 20.06.2005

Drawings, Sheets

1/2, 2/2 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☒ the description, pages 1-4
   - ☒ the claims, Nos. 1-5
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/PL2004/000092

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	3, 6-8
	No:	Claims	1,2,4,5,9
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-9
Industrial applicability (IA)	Yes:	Claims	1-9
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item I.

This preliminary examination report is based on the originally filed application. The amendments of 20.06.2005 (new claims 1-5, deleting old 6-9 and new description, pages 1-4) are considered to go beyond the disclosure of the international application as filed (Article 34(2)(b) PCT):

Deficiencies (features that go beyond the originally filed disclosure):

Claim 1, filed 20.06.2005:
- [illegible] dryer body

Claim 2, filed 20.06.2005:
- the claimed measures

Description, filed 20.06.2005
- from "The summary of the invention" and further on.

If the applicant considers to continue the examination procedure in the national phase, the applicant is recommended to base his amendments on the application as originally filed at the ISA on 19.11.2004. Special care should be taken not to add any new subject matter not already disclosed in the original application. See also paragraph 5.5 below.

Re Item V.

5.1 Reference is made to the following documents:
D1: US-A-4 751 035 (MCHENRY ET AL) 14 June 1988 (1988-06-14)
D2: WO 83/01766 A (THE CONTINENTAL GROUP, INC) 26 May 1983 (1983-05-26)
D3: EP-A-0 482 652 (NISSEI ASB MACHINE CO., LTD) 29 April 1992 (1992-04-29)
D4: EP-A-0 976 456 (A.K. TECHNICAL LABORATORY, INC) 9 February 2000 (2000-02-[illegible])
D5: US-A-5 833 085 (VALYI ET AL) 10 November 1998 (1998-11-10)

INDEPENDENT CLAIM 1

5.2 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.
Document D1 discloses (the references in parentheses applying to this document):

A preform of a plastic container designed for packaging foodstuffs (figure 1A), comprising a container body with a convex hemispheral bottom (38), wherein the body has a conical shape (11) that opens upwards and ends with a cylindrical neck (12) surrounded by a flange terminated in a rim* (13).

It is noted that also document D2 contains all features of claim 1.

* From figures 2-5, in particular figure 5, of the present application it's clear that any kind of ending of a flange is called a rim.

DEPENDENT CLAIMS 2, 4, 5, 9

5.3 Dependent claims 2, 4*, 5 and 9 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Article 33(2) and (3) PCT), see document D1, figure 1A.

* To manufacture a preform without radiuses (arced transition surfaces) is impossible, therefore the arched transition is implicitly contained in document D1.

DEPENDENT CLAIMS 3, 6-8

5.4 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 3, 6-8 does involve an inventive step in the sense of Article 33(3) PCT. See also paragraph 5.5 below.

Document D1 which is considered to represent the most relevant state of the art, discloses a preform from which the subject-matter of claims 3, 6-8 differs in that:

- the flange has a thickness of 0.3mm, and
- bottom of the flange has annular thickenings (on top and/or underneath) whose height

varies from 1.1 to 2.0 times the flange thickness.

The technical effect of these features are that:
- the flange is soft enough to adapt to the lid to be sealed to the flange, and
- the flange is strong enough for providing a quality connection between the lid and the container.

The problem to be solved by the present invention may therefore be regarded as:
- how to design a lid that is soft enough to adapt to the lid, and
- how to design a flange that is strong enough for providing a quality connection between the lid and the container

5.4.1 Claim 3: The thickness 0.3mm that provides a soft flange seems to be a normal thickness of a flange that is to be sealed by a lid, see document D3, claim 4.

5.4.2 Claims 6-8: The use of thickenings around the flange of preforms to be sealed with a lid seems to be one of several straightforward possibilities to reinforce the flange, without the exercise of inventive skill, in order to solve the problem posed (see document D4, figure 3, paragraphs 24-28, 35, figure 3; document D5, figure 2). No unexpected advantage can be seen with the range 1.1-2.0 proposed by the claims. The thicker the thickening around the flange, the stronger the flange. The range also seems too broad to give any unique advantage.

5.5 For claims 6-8 the examining division would have re-considered the possibility of inventiveness if the applicant had presented convincing arguments using the "problem solution approach", showing why the claimed features are inventive. See also paragraph 7.4 below.

Re Item VII.

7.1 The reference signs used in the claims and in the description are underlined. Preferably the underlining is removed (Rule 6.2(b) PCT).

7.2 Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT.

which in the present case would have been appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

7.3 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

7.4 From the description it is not fully clear which the problems of the state of the art preforms are and which features are added to the preform according to the invention of the present application and how these features solves the problems of the state of the art (Rule 5 PCT). See also paragraph 5.5 above.

Re Item VIII.

8 The application does not meet the requirements of Article 6 PCT, because in claim 3 it is not mentioned where the two wall thicknesses are to be measured, thereby rendering the definition of the subject-matter of said claim unclear, Article 6 PCT.

DESCRIPTION AMENDED UNDER ART. 34

A preform of a plastic container particularly for packaging foodstuffs

The field of the invention

This invention relates to the preform of a plastic container particularly for packaging foodstuffs. This preform is formed using the conventional injection moulding machinery and utilised to form plastic containers, such as cans, for packaging foodstuffs, and especially to blow mould thin-walled containers which can be hermetically closed with a metal lid secured to the container by seaming the lid flange on filling machines, without deforming the flange or the cylindrical neck under it.

The state of art

The Polish patent application no. P 336 680 A1 relates to a plastic preform designed for forming thin-walled containers. The preform has a threaded neck and a cylindrical body terminated with a convex hemispherical bottom. The body diameter of this preform is 0.5 to 0.85, and the body wall thickness is 0.08 to 0.18, of the neck diameter.

It has been known for some time how to form thin-walled containers terminated with a flange by blow moulding the conventional preform and then severing the top portion of the container including a threaded neck. In this way immense amounts of scrap are produced, which the result that the whole process is highly uneconomical. Furthermore, this method leaves much uncertainty about the reliability of the closure, including its tightness and resistance to pressures inside the container. The edge of the container flange may become nicked by cutting operations and its thickness may vary along the circumference, which is normal as the flange is blow moulded as a part of the side wall of a larger container.

In order for the closure of the plastic container to be tight under pressure, it would be best if the container was formed by a stretch blow moulding process from the injection moulded preform. Patent EP 0482652B1 describes a cylindrical preform with a flat bottom, wherein the bottom is much thinner than the preform walls that gradually slightly part. Due to the fact that the flow of material is hindered, it is impossible to achieve the flange thickness that is below 0.3 mm. The preform flange is smooth and does not have a thickened rim.

Patent WO-A 83/01766 presents a preform, which is generally cylindrical in shape and slighly tapers in the downward direction; its walls and bottom have the same thickness. The flange is smooth and does not have a thickened rim. It has been noted in the document that it is impossible for one to achieve a good degree of material orientation in the flange of such preform; hence, its strength is insufficient for good quality connection between the metal lid and the container.

The document US 4 751 035 A presents a multi-layer preform where the transition between the

conical and cylindrical parts takes the form of a step down, while the flange is relatively thick (0.6 mm). The above-mentioned multi-layer preform solves the problem of multi-layer injection, while it fails to achieve the required optimal flange parameters. It is evident that neither the neck nor the flange are affected by the blow moulding process and that they should emulate the neck and flange shape of a metal can as closely as practicable, in order to enable closing using a typical metal lid. This problem was solved by the invention presented herein, which allows one to obtain a thin, elastic and strong flange by the injection of the moulding of the preform, that is suitable for double seaming of a metal lid using typical closing machines. The route along which the plastic material flows during the injection moulding of the preform performs a decisive impact on the mechanical properties of the flange. A thickened rim on the preform flange also plays an important role. Not only does it improve the hermetic connection between the metal lid and the flange but it also prevents the thin flange from slipping out of the lock.

The summary of the invention

A preform of a plastic container designed particularly for packaging foodstuffs comprising a conically-shaped container body with a convex hemispherical bottom, which flares towards a cylindrical neck, characterized by the single-layer body in which the external diameter of the cone as measured at the point of connection with the cylindrical part is equal to the external diameter of the cylindrical part, where the cylindrical part ends with a flange terminated in a thickened rim. The opening angle of the internal conical surface of the body is greater than the opening angle of the external conical surface of the body; hence, the bottom is the thickest part of the container body and the cylindrical neck is significantly thinner than the bottom. The inflow of the material to the neck space and then to the flange is easy. This is due to the fact that the bottom at the injection point is relatively thick, the walls are appropriately inclined and their thickness tapers in a favourable manner. The material flow velocity in the mould is relatively high during the forming process with the result that the time taken by the material to reach the preform peripheries, including the flange, is short and a decline in temperature of the flowing material is much lower, which allows for appropriate filling and orientation and ensures a far better flange strength. In this way, it is possible for the flange thickness to be less than 0.25 mm, which is required for good quality seaming of the metal lid. The flange has a good degree of material orientation, is elastic and strong. The best seaming quality is achieved when there is a gradual change in thickness between the cylindrical neck and the flange and the transition between these two elements is arched.

Preferably, the ratio of the flange thickness to the cylindrical neck thickness should be approximately 0.8.

Furthermore, in order to ensure that the container metal lid fits precisely into the flange rim, it is desirable that the angle between the flange and the cylindrical neck is $180^0 - \gamma$, where γ lies within a range of 60^0 to 90^0, and most preferably equals 78^0.
In order for the seaming operation to ensure a good quality connection between the pressure container and the metal lid, the flange should terminate in a thickened annular rim showing on one or both sides of the flange ending. The height of the annular thickened rim should vary from 1.1 to 2.0 of the flange thickness.

The brief description of the drawings

The present invention has been described in greater detail below in its advantageous examples of embodiments with reference to the enclosed drawings. Fig. 1 presents an axial sectional view of the preform. Fig. 2 presents an enlarged picture of the preform flange with a double-sided annular thickened rim. Fig. 3 presents an enlarged picture of the preform flange with a one-sided annular thickened rim on top of the flange. Fig. 4 presents an enlarged picture of the preform flange with a one-sided annular thickened flange rim underneath the flange. Fig. 5 presents an enlarged picture of the preform flange with rectangular flange ending.

The most efficient version

As shown in Fig. 1, the preform 1 of a plastic container particularly for packaging foodstuffs, includes a body 4 with a convex hemispherical bottom 6. The body 4 has a conical shape that opens upwards and ends with a cylindrical neck 2 surrounded by a radially outwardly extended flange 3 terminated in a thickened rim 5. The thickness of the body 4 decreases gradually starting from the bottom 6; therefore, the thickness g2 of the cylindrical neck 2 as measured at any point along the cylindrical wall is significantly less than the thickness g3 of the bottom 6. The flange thickness g1 as measured at a distance of approximately 5 mm from the flange end (preferably app. 0.20 mm) is less than 0.25 mm.
Fig. 2 shows an enlarged rim 5 of the flange 3 of the preform 1 which is deviated from the cylindrical neck at an angle of $180^0 - \gamma$, where γ lies within a range of 60^0 to 90^0. The flange 3 terminates in an annular thickened rim 5a on both its sides. The height h of the thickened rim 5a varies from 1.1 to 2.0 of the flange thickness g1.
Fig. 3 shows an enlarged rim 5 of the flange 3 of the preform 1 which is deviated from the cylindrical neck at an angle of $180^0 - \gamma$, where γ lies within a range of 60^0 to 90^0. The flange 3 terminates in a one-sided annular thickened rim 5b on the top of it. The height h of the thickened rim 5b varies from 1.1 to 2.0 of the flange thickness g1.
Fig. 4 shows an enlarged rim 5 of the flange 3 of the preform 1 which is deviated from the cylindrical neck at an angle of $180^0 - \gamma$, where γ lies within a range of 60^0 to 90^0. The flange 3

terminates in a one-sided annular thickened rim 5c underneath it. The height h of the thickened rim 5c varies from 1.1 to 2.0 of the flange thickness g1.

Fig. 5 shows an enlarged rim 5 of the flange 3 of the preform 1 which is deviated from the cylindrical neck at an angle of $180^0 - \gamma$, where γ lies within a range of 60^0 to 90^0. The flange 3 terminates in a rectangular rim 5d whose height h is generally equal to the flange thickness g1.

The preform 1 in the described embodiment has typical external dimentions D1 (max. diameter and H (height) is made of polyethylene terephthalate (PET), a thermoplastic material specifically designed for packaging foodstuffs. When using the subject preform to blow mould a thin-walled container, the diameters D1 and D2 of the cylindrical neck 2 and the flange 3 do not change. A relatively small flange thickness allows for a better fit of the metal lid at the first stage of the double seaming process. The thickening of the flange rim ensures a good closure of the container body at the second stage of the double seaming process and also prevents the thin flange from slipping out of the lock..

SUPERSEDED

Claims

1. A preform of a plastic container designed particularly for packaging foodstuffs comprising a conically-shaped container body with a convex hemispherical bottom, which flares towards a cylindrical neck, characterised by the single-layer body (4) in which the external diameter of the cone as measured at the point of connection with the cylindrical part (2) is equal to the external diameter of the cylindrical part, where the cylindrical part (2) ends with a flange (3) terminated in a thickened rim (5).
2. The preform according to claim 1 is characterised by the fact that the thickness (g1) of the flange (3) as measured at a distance of approximately 0.5 mm from the flange end (3) is less than 0.25 mm (preferably app. 0.20 mm) and that the wall thickness (g1) is less than or equal to the cylindrical neck wall thickness (g2).
3. The preform according to claim (1) is characterised by that the rim (5) of the flange (3) has a annular thickening (5a) on top and underneath it, whose height (h) varies from 1.1 to 2.0 of the flange thickness (g1).
4. The perform according to claim (1) is characterised by that the rim (5) of the flange (3) has a ring-like one-sided thickening (5b) on top of it, whose height (h) varies from 1.1 to 2.0 of the flange thickness (g1).
5. The preform according to claim (1) is characterised by that the rim (5) of the flange (3) has a ring-like one-sided thickening (5c) underneath it, whose height (h) varies from 1.1 to 2.0 of the flange thickness (g1).

"Comprises/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps or components or groups thereof.

The claims which follow are to be considered as an integral part of the present disclosure. Reference numbers (directed to the drawings) shown in the claims serve to facilitate the correlation of integers of the claims with illustrated features of the preferred embodiment(s), but are not intended to restrict in any way the language of the claims to what is shown in the drawings, unless the contrary is clearly apparent from the context.

AMENDED CLAIMS
[received by the International Bureau on 18 May 2005 (18.05.05);
Original claims 1 to 9 replaced by new claims 1 to 5 (1 page)]

1.A preform of a plastic container comprising a conically-shaped container body with a convex hemispherical bottom, which flares towards a cylindrical neck, whereby the single-layer body (4) in which the external diameter of the cone as measured at the point of connection with the cylindrical part (2) is equal to the external diameter of the cylindrical part, where the cylindrical part (2) ends with a flange (3) terminated in a thickened rim (5).

2. The preform according to claim 1 which is designed for packaging foodstuffs.

3. The preform according to claim 1 or 2, wherein the thickness (g1) of the flange (3) as measured at a distance of approximately 0.5 mm from the flange end (3) is less than 0.25 mm and the wall thickness (g1) is less than or equal to the cylindrical neck wall thickness (g2).

4. The preform according to claim 3, wherein the thickness (g1) of the flange (3) is approximately 0.20 mm.

5. The preform according to any one of claims 1 to 4, wherein the rim (5) of the flange (3) has a annular thickening (5a) on top and underneath it, whose height (h) varies from 1.1 to 2.0 of the flange thickness (g1).

6. The preform according to claim 1 or 2, wherein the rim (5) of the flange (3) has a ring-like one-sided thickening (5b) on top of it, whose height (h) varies from 1.1 to 2.0 of the flange thickness (g1).

7. The preform according to claim 1 or 2, wherein the rim (5) of the flange (3) has a ring-like one-sided thickening (5c) underneath it, whose height (h) varies from 1.1 to 2.0 of the flange thickness (g1).

AMENDED SHEETS

8. The preform including any new and inventive integer or combination of integers, substantially as herein described.

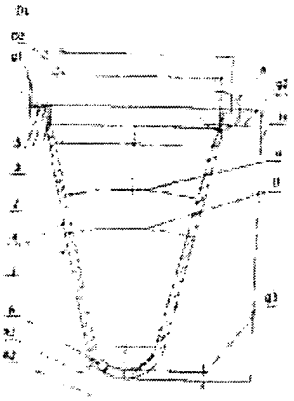
9. The preform according to the invention, as hereinbefore generally described.

10. The preform as specifically described with reference to or as illustrated in the accompanying drawings.

ABSTRACT

21 2006/04925 22 19 June 2006 DA 14.05.2007
51 B 65 D; B 29 C
71 Inventia Spółka Z O.O.
72 Mikoajski, Bogumił, Lewandowski, Dariusz, Taborowicz, Andrzej
33 PL 31 P 363595 32 20 November 2003.
54 **A preform of a plastic container particularly for packaging foodstuffs.**
60 28

57 This invention relates to the perform to produce a plastic container for packaging foodstuffs, and especially to ultra thin-walled containers which can be hermetically closed with a metal lid by double seaming. The pre-form (1) includes a body (4) and a coaxial hemispherical bottom (6). The body (4) has a conical shape that flares towards a cylindrical neck (2) surrounded by a flange (3) that terminates in a thickened rim (5). Preferably, the angle (α) at which the internal body surface (4) flares towards the cylindrical neck is greater than the angle (β) at which the external body surface (4) opens upwards, and the thickness (g2) of the cylindrical neck (2) is less than the thickness (g3) of the bottom (6).



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